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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

BITTERROOT-DEERLODGE FOREST INSECT CONTROL PROJECT

Recommendations for Future Control

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INTRODUCTION

The intent of this report will be to propose plans for the continuation of the Bitterroot-Deerlodge insect control project which was instituted in May 1925. To support some of the positions taken it will be necessary to touch briefly upon the results obtained by last season's work.

The following memorandum is self-explanatory and is included, verbatim rather than by reference, in this report for the information and convenience of its readers:

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Insect-Control August 4, 1925.

MEMORANDUM FOR FILES

A conference was held in Missoula July 27 with Evenden, Craighead, Carter, White and Koch present, re the bark beetle control project on the Bitterroot and Bighole. Conclusions were as follows:

1. Reconnaissance.

It was agreed to turn over the job of reconnaisance to Mr. Evenden, who will take full responsibility for handling the work. An allotment of $1200 will be made to the Bitterroot Forest, and all accounts for supplies and labor will be vouchered on the Bitterroot. The Forest will, however, have no responsibility except for handling the accounts.

The purpose of the reconnaissance will be to determine the location of the insect attack after this summer's flight, to determine how and where control measures should be undertaken, and to get an estimate of the cost.

If it seems practicable, control work will be done in conjunction with scouting on the Bighole drainage, since trees are scattered, and it will be cheaper to treat infested as found. If necessary, an increase in allotment will be made to cover this work.

2. Control Work.

It is recognized that definite plans for control cannot be set up until the reconnaissance is completed. In general, however, the objects will be (1) to prevent spread of the attack across the divide to the Bighole; (2) to prevent spread westerly to the yellow pine in the East Fork and West Fork of the Bitterroot; (3) to prevent spread to the north into Weeping Child and Skalkaho.

The control work will be handled by the Forest Service, as was done last spring.

/S/ ELERS KOCH
Assistant District Forester.

The survey mentioned in the above memorandum was completed during the months of August and September the data from which has proved to be indispensible in the formulating of plans for further control. The status of the insect infestation in relation to the three objectives given, follows:

OBJECTIVE No. 1

Prevention of the Spread of the Infestation into the Big Hole Basin

The data obtained by the insect survey shows that there has been a very marked increase in the infestation during the past year, especially

in the Beaverhead portion of the Big Hole Basin. It is estimated that there are at least one thousand trees in the area between Thompson and Bender Creeks. Though of course many trees were missed during the control operation, there were only 271 treated in this rather small area last spring. This shows a very big increase over the 1924 attack, which can perhaps be accounted for by the spread of the insects across the Continental Divide from the heads of Meadow and Swift Creeks.

OBJECTIVE NO. 2

Protection of the West Fork of the Bitterroot River

As a result of the survey it is now known that the extreme limits of the infestation on the south side of the East Fork, lie along the divide between Tolan and Reimel Creeks and along the Continental Divide at the head of Tolan Creek. On the west side of Tolan Creek the infestation is very scattered and is in small isolated groups of two to five trees, however along the east side adjacent to the Meadow Creek drainage, it is much heavier and large groups of 1925 infested trees are present. There are approximately 1500 (plus) trees scattered throughout the Tolan and Mink Creek drainages which were attacked during the past season. To establish a defensive zone in this region it would be necessary to include the Mink Creek drainage with the Tolan, and the offensive should also be pushed across the divide between Tolan and Meadow Creek.

OBJECTIVE NO. 3

Prevention of the Northern Spread into the Weeping Child Drainage

During the past season the infestation throughout this zone of defense has increased several hundred per cent, and it was found that it extends northeast as far as, and including, the head of Rye Creek. In the Bertie Lord drainage there was a very severe increase over the 1924 attack. This increase was heaviest along the east of the drainage where it undoubtedly came from the Martin Creek region.

RESULTS OF CONTROL WORK IN THE BERTIE LORD AND AT THE MOUTH OF MEADOW CREEK

In the Bertie Lord drainage there were 1,733 tree treated in the control operation of last spring. While actual figures are not available as to the number of 1925 attacked trees it is safe to say that there are at least 8,000 within this area alone. To determine somewhat the rate of increase between the 1924 and 1925 attacks six groups of treated trees were re-surveyed and the newly attacked trees counted and marked. These groups were located along the divide between the Bertie Lord and Martin Creeks where the infestation is no doubt the heaviest.

Table showing the Rate of Increase in Six Groups of Infested Trees Along the Ridge Between Bertie Lord and Martin Creeks:

Group	Treated 1924	Attacked 1925	Per Cent of Increase
1	18	35	190
2	31	49	158
3	2	21	1050
4	18	75	400
5	38	111	300
6	10	161	1610

In addition to the above group surveys, four miles of strip one chain wide was run along this divide which showed the 1925 attack to average 10 trees per acre. It is understood, of course, that this figure cannot be applied to the entire drainage as the area surveyed carries the heaviest infestation.

At the mouth of Meadow Creek in the region treated there has been a decided increase in the infestation by the 1925 attack. For the purpose of determining the per cent of this increase a strip survey was made of this area.

A summary of this survey follows:

Total distance covered	6.8 miles	
Total acerage covered	54.9 A	
	1924	1925
Total number of trees recorded	240	587
Trees per acre of strip	4.3	15.4
Per cent of Increase		358%

There can be no doubt but that this increase came by flight from the heavy block of infestation on the ridge between Swift Creek and the East Fork of the Bitterroot River.

PLANS OF CONTROL

It would seem that there can no longer be a question as to the effectiveness of the advance spot theory of control. The writer is more firmly convinced than ever that the severe depredations caused by these outbreaks of the mountain pine beetle results from the spread of the insects from the main blocks of the infestation and not through the development of the advance spots. If this premise is accepted then all that could be accomplished by the treatment of these advanced spots is a

reduction in the next year's infestation equal to the per cent of the total number of insects destroyed. In other words if 5% of the infested trees within an area are treated then theoretically the next year's loss would be but 95% of what it would have been if no control work had been instituted. It would seem that control plans of this character, where a thorough clean up of the entire infestation is not attempted, must be regarded merely as a holding plan of defense. However it would seem that once the head of the epidemic is reached and a zone of defense established, if sufficient funds are available to hold the area until the supply of beetles has been exhausted through control measures assisted by natural agencies, then theoretically the work should be a success. So in future plans of controlling the epidemics of the mountain pine beetle in lodgepole pine, it is believed that the spread of the infestation must be considered.

In the past some very fine results have been secured from peeling the standing trees, to the heighth of 10 to 15 feet. This success has been secured in small outbreaks of the mountain pine beetle where the woodpecker work in the upper portion of the lodgepole pine trees was a factor. In such large epidemics as we are now considering this factor is so small that it cannot be considered as being of any value in thoughts of control. In an area where it is desired to destroy the greatest number of beetles with a certain sum of money, it could best be accomplished by peeling the standing trees, as the heaviest brood is nearly always at the base. However, where a 100% clean up is

attempted as would be the case in a holding plan of defense, the entire infested length of the trees must be treated.

This can best be accomplished by felling the trees and peeling the bark from the infested portion of the bole, or by burning. An additional advantage is gained by the felling of the trees as the area would be free of all red tops which would assist materially in the surveys following control.

The Following Table Shows the Per Cent of Mountain Pine Beetle Broods at Different Heights from Ground in Lodgepole Pine. Bitterroot National Forest (1925):

DBH	HEIGHT ON TREE IN FEET														
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
9"	35	67	90	96	99	Per Cent of Brood									
11"	22	42	57	69	78	86	94	98	100	Per Cent of Brood					
12"	21	42	58	71	80	87	93	97	99	100	Per Cent of Brood				
13"	11	27	43	54	63	71	77	82	87	90	94	97	99	100	

In last seasons operations the trees were peeled at an average of 12½ feet from the ground. Trees above 13" D.B.H. were not included in this study.

FUTURE CONTROL PLANS

Recommendations for future control work will be covered in two recommendations. These recommendations will be presented as fairly and clearly as possible in order that in their adoption or refusal the situation may be made understood as well as possible.

The thoughts of accomplishing Objective No. 3, are not believed to be feasible. In view of the fact that this Objective can only be undertaken after Nos. 1 and 2 are under way, and because of the extremely large appropriation which would be required, it is recommended that this plan be dropped.

CONTROL PLAN No. 1

Inasmuch as there has been a marked increase in the infestation during the past year or two it is imperative that if control work is to be instituted in the Big Hole Basin it be started during the spring of 1926. It is therefore recommended that future work on this project be concentrated in this region. This would be in concurrence with the memorandum as quoted as being the primary objective to be gained, and it is by far the most feasible plan of the three and offers the most assurance of success.

This plan would call for the treatment of all infested trees within the Big Hole Basin northwest of the Big Hole River, and if funds were then available the defense would be pushed across the divide at the places where the infestation is most likely to be crossing at this or any future time. Though of course there is nothing to prove such a contention it seems very probable that the insects have already started to cross into this area from the heads of Meadow and Swift Creeks.

This is thought to be the most feasible plan of control as it is possible that the primary spread of the infestation on the East Fork will continue south along the west side of the Continental Divide, and that the flight of the beetles into the Big Hole Basin will prove to be but a rolling over or side wash from the main advance. Should this plan be adopted it must be on at least a five year program and the infested trees of this area will have to be treated each year until the Bitterroot epidemic has be exhausted or has passed by. Furthermore it will be impossible to determine the allotment required except from year to year as it will be extremely variable. There is however this assurance that there will be at least two years of heavy infestation to combat should the insects cross the divide. However, with sufficient funds it is believed that in this manner the timber in the Big Hole Basin can be protected.

It is estimated that from ten thousand to twelve thousand dollars will be required for the control work within the Big Hole Basin for the spring of 1926.

CONTROL PLAN No. 2

As Objectives No.1 and No.2 are very closely tied together, inasmuch as any work done at the head of Tolan Creek will serve to prevent the beetles from crossing the divide at that point, a plan covering both these objectives could be adopted if funds were available. However, the holding of a defensive zone comprising the Tolan and Mink Creeks drainages will prove to be a very difficult task. There is little doubt but that the main block of this infestation which now rests on the west side of

Meadow Creek will spread into this region which makes the success of this plan very doubtful. As it would require a very heavy expenditure for several years to come, with two or more years of extremely heavy infestations to combat, it is believed that should this plan be adopted the greatest benefit gained would prove to be the additional protection given to the Big Hole Basin, or Objective No. 1.

It must be understood of course that should this plan be adopted it must also be on at least a five year program or until the source of the infestation no longer exists. The plan of control followed would call for the treatment of all infested trees within the Tolan and Mink Creek drainages and the pushing of the offense over the divide into Meadow Creek.

From fifteen to seventeen thousand dollars would be required in the spring of 1926 to treat the infested trees under this plan of control. i.e. including L.H. Big Ll. + Tolan Cr. 9/6

SUMMARY

Though this report carries two plans of control it must be remembered that they have been given on an experimental basis only and that no guarantees of success can be made. Of these two plans it is recommended that the one (Control Plan No.1) calling for the protection of the Big Hole Basin be adopted. This recommendation is based upon the belief that our efforts should perhaps be centralized upon this project as it offers the most assurance of success at this time. However with

understanding of the situation as given in this report and of the funds required for the continuance of this project, it is desired that the adoption of these plans be left to the Forest Service, whose decision will be satisfactory to this Bureau.

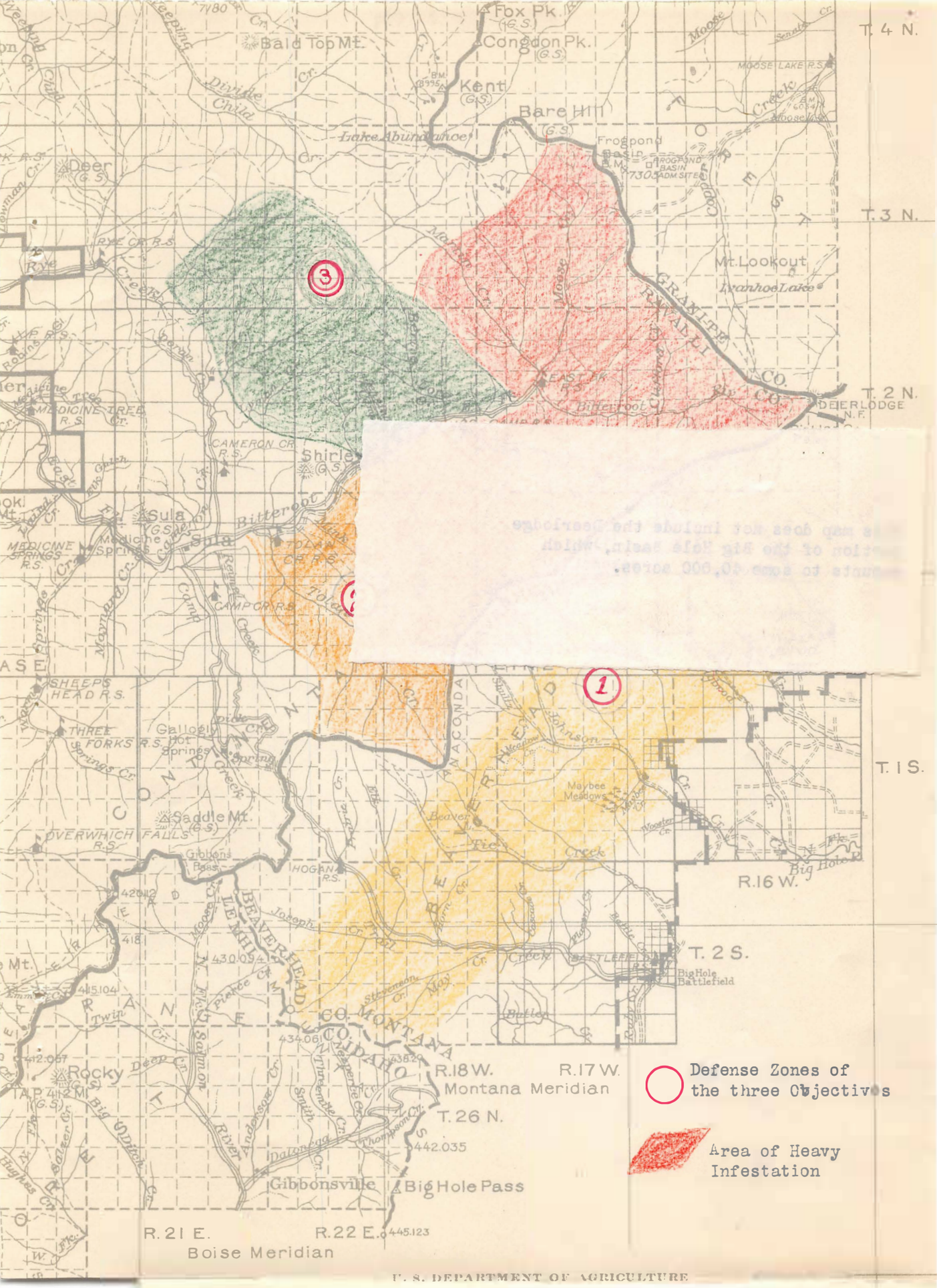
The statement as to the appropriation required to handle these projects in the spring of 1926, are but estimates. However it is believed that they will prove to be sufficient.

As nothing is known of the status of the insect infestation on the southeast side of the Big Hole River it is recommended that an extensive survey be made of this region during the summer season of 1926.

Respectfully submitted,

James C. Evenden

James C. Evenden,
Associate Entomologist.



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FOREST SERVICE

W. B. GREELEY, FORESTER

BITTERROOT NATIONAL FOREST

MONTANA

MONTANA PRINCIPAL MERIDIAN

1923

Scale

NATIONAL FOREST BOUNDARY

ADJACENT NATIONAL FOREST BOUNDARY

Polyconic projection
North American datum